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(71) Applicant: **Honda Giken Kogyo Kabushiki Kaisha**  
**Minato-ku, Tokyo 107-8556 (JP)**

(72) Inventors:  
• **KONNO, Takeshi**  
**Wako-shi, Saitama 351-0193 (JP)**

• **KOMAKI, Akira**  
**Wako-shi, Saitama 351-0193 (JP)**

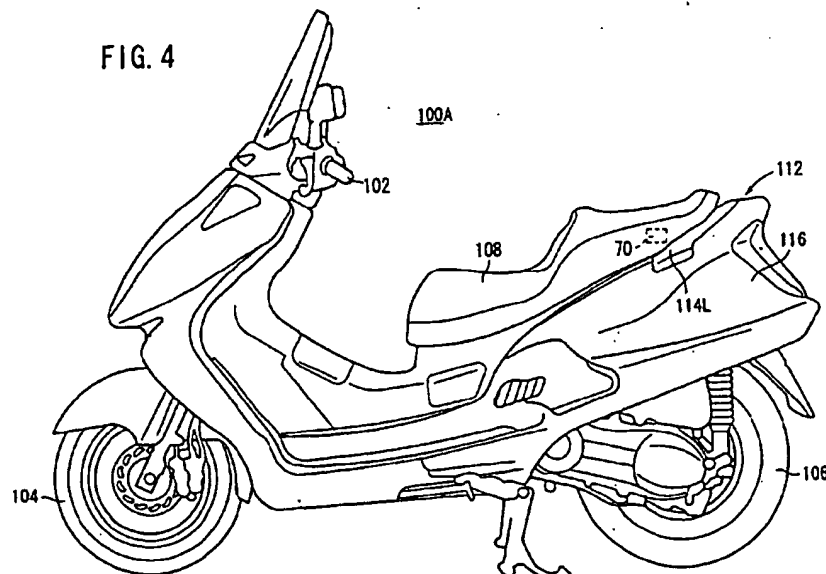
(74) Representative:  
**Prechtel, Jörg, Dipl.-Phys. Dr. et al**  
**Weickmann & Weickmann**  
**Patentanwälte**  
**Postfach 86 08 20**  
**81635 München (DE)**

**(54) MOTORCYCLE ELECTRONIC KEY SYSTEM**

(57) In an electronic key system for a motorcycle including the control unit (14) mounted on the specific vehicle (100A) and a mobile transmitter-receiver (12) that the user carries, the specific vehicle (100A) includes an openable and closable seat (108) on which the user sits, and is provided with a start switch (70) used for starting

the control unit in the seat (108). More specifically, the start switch (70) is installed on, for example, the left side surface inside the seat (108) at the position corresponding to the portion which the user touches when opening the seat (108). An operating element (70a) of the start switch (70) opposes the back surface of the superficial skin (122a) on the left side of the seat (108).

**FIG. 4**



from CSP-110-A, CSP-111-A, CSP-112-A

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sible to provide a means for stopping power supply at least to a circuit system of the control unit, which performs communication, when the specific vehicle is not actuated for a predetermined period, and a means for supplying power to the circuit system based on the turning-ON operation of the start switch.

[0013] Accordingly, when the specific vehicle is not actuated for a predetermined period, power supply to the communication-related circuit is stopped until the start switch is turned ON subsequently, whereby power consumption during waiting time can significantly be reduced.

[0014] In addition, since communication with the outside (communication with the mobile transmitter-receiver or reception of a request signal from the mobile transmitter) is not performed unless the start switch is turned ON, and the start switch cannot be found easily, it is also effective for protecting against theft.

[0015] In the invention described above, it is also possible to provide a means for supplying power intermittently at least to the circuit system of the control system, which performs communication, when the specific vehicle is not activated for a predetermined period, and a means for supplying power constantly to the circuit system based on the turning-ON operation of the start switch.

[0016] Accordingly, when the specific vehicle is not actuated for a predetermined period, power supply to the communication related circuit is performed intermittently until the start switch is turned ON thereafter, whereby power consumption during waiting time may be reduced.

[0017] In the invention described above, an operating element of the start switch may be provided so as to oppose the back surface of the superficial skin of the seat. In this case, by pressing the portion of the superficial skin of the seat corresponding to the portion where the operating element of the start switch is located, the start switch can easily be turned ON.

[0018] Normally, when opening the seat, two actions (two behaviors) including the steps of unlocking the seat by operating the start switch and lifting the seat are necessary. However, by providing the operating element of the start switch so as to oppose the back surface of the superficial skin on the side surface of the seat (including the surface at the back of the seat), the start switch can be operated simultaneously with touching the seat for opening the seat. Therefore, the operation from the operation of the start switch to lifting of the seat can be performed by one behavior, thereby improving usability.

[0019] In the invention described above, the start switch may be provided on a handle used at least for manually opening and closing the seat. In this case, when a helmet stored under the openable and closable seat is taken out, the action to grip the handle and lift the seat up is performed. When performing this action, the start switch can easily be operated, and thus it is advantageous for improving operability.

[0020] In particular, by disposing the start switch on the handle at the position opposing the seat, the start switch may be provided at the position where the user touches naturally when opening the seat, thereby usability is increased.

[0021] The above and other objects features and advantages of the present invention will become more apparent from the following description when taken in conjunction with the accompanying drawings in which a preferred embodiment of the present invention is shown by way of illustrative example.

## BRIEF DESCRIPTION OF THE DRAWINGS

[0022]

Fig. 1 is a drawing showing a construction of an electronic key system according to a first embodiment.

Fig. 2 is a block diagram showing a construction of an electronic key in the electronic key system according to the first embodiment.

Fig. 3 is a block diagram showing a construction of a control unit in the electronic key system according to the first embodiment.

Fig. 4 is a side view showing one example of the specific vehicle.

Fig. 5 is an explanatory drawing showing a state in which the seat of the specific vehicle (See FIG.4) is opened.

Fig. 6 is a cross sectional view showing a construction of a seat with part of it omitted.

Fig. 7 is a side view showing another example of the specific vehicle.

Fig. 8 is an explanatory drawing showing a state in which the seat of the specific vehicle (See FIG.7) is opened.

Fig. 9 is an explanatory drawing showing an example of a method of installing the start switch.

Fig. 10A is a side view showing an example of the position of the specific vehicle to which a transmitting antenna is installed.

Fig. 10B is a plan view thereof.

Fig. 11A to Fig. 11E are timing charts showing an example of a processing of the electronic key system according to the first embodiment.

Fig. 12 is a block diagram showing a construction of an electronic key in an electronic key system according to a second embodiment.

Fig. 13 is a block diagram showing a construction of a control unit in the electronic key system according to the second embodiment.

Fig. 14 is a block diagram showing a construction of a control unit in an electronic key system according to a third embodiment.

126 formed in the urethane material 124, and a housing 128 of the start switch 70 is fixed to the bottom plate 120 with, for example, a screw, etc. The start switch 70 is installed on, for example, the left side surface inside the seat 108 at the position corresponding to the portion which the user touches when opening the seat 108.

[0039] An operating element 70a of the start switch 70 opposes the back surface of a superficial skin 122a on the left side surface of the seat 108. The distance between the distal end of the operating element 70a and the back surface of the superficial skin 122a is determined to such distance that the start switch 70 is turned ON when the user presses the superficial skin 122a on the left side surface of the seat 108 for opening the seat 108. In the example described above, the case in which the start switch 70 is provided on the left side surface of the seat 108. However, it may be provided either on the right side surface of the seat 108 or on both of the left side surface and the right side surface.

[0040] In the specific vehicle 100B, as shown in Fig. 7, the start switch 70 is provided on the handle 112. More specifically, as shown in Fig. 8 and Fig. 9, a recess 130 is formed at the lengthwise center of the left bar 114L and/or the right bar 114R at the position opposing the rear portion of the seat 108, and the start switch 70 is provided in the recess 130, so that the start switch 70 is integrated with the left bar 114L and/or the right bar 114R.

[0041] Normally, when gripping, for example, the left bar 114L, the lengthwise center thereof is gripped. However, since the start switch 70 is provided at this position as described above, the hand of the user touches the start switch 70 naturally when operating the seat handle 112.

[0042] On the other hand, as shown in Fig. 3, the power circuit 40 in the control unit 14 supplies power from the battery 60 to the CPU 42, the receiving circuit 44, and the transmitting circuit 46.

[0043] The receiving circuit 44 has a receiving antenna, not shown, receives a response signal Sa or the like transmitted from the electronic key 12 through the receiving antenna, and takes them out from the carrier wave and demodulates the same. The demodulated signal is supplied to the CPU 42.

[0044] The CPU 42 performs at least three programs (a request signal generating means 80, a response signal verifying means 82, and an observing means 84).

[0045] The request signal generating means 80 read request data Dr (data which is a source of the request signal Sr) from a ROM, not shown, based on the turning ON operation of the start switch 70, and supplies it to the transmitting circuit 46.

[0046] The transmitting circuit 46 modulates the carrier wave based on the request data Dr supplied from the CPU 42 and transmits it through the transmitting antenna 72 as the request signal Sr.

[0047] The range in which the request signal Sr can be transmitted is, as shown in Fig. 10A and Fig. 10B, a

spherical range of 1 to 1.5 m in radius about the transmitting antenna 72 mounted to the specific vehicles 100A and 100B (range shown by a circle A in Fig. 10A and Fig. 10B), and is smaller than the range in which the response signal Sa can be transmitted (the range of several meters in radius about the electronic key 12).

[0048] Therefore, when the scooter is assumed as the specific vehicles 100A and 100B, in order to ensure communication with the electronic key 12 that the user carries when the user rides on the specific vehicle, or when the user is opening the seat 108, it is desired to install the transmitting antenna 72, for example, at the position near the center of the specific vehicles 100A and 100B as shown in Fig. 10A and Fig. 10B.

[0049] The position near the center of the specific vehicles 100A and 100B means the area from a point P1, which is at one-fourth of the line segment 140 between the center 104a of the front wheel 104 and the center 106a of the rear wheel 106 to a point P2, which is at three-fourth of the same line segment, for example, from the center 104a of the front wheel 104. This point is similar even if there is a type of autobicycle which is not illustrated. In the first embodiment, the transmitting antenna 72 is installed at the position near the front portion of the seat 108.

[0050] The response signal verifying means 82 verifies whether or not the signal supplied from the receiving circuit 44 is the response signal Sa, and if it is the response signal Sa, verifies whether or not ID data contained in the response signal Sa is identical to the ID data registered in a memory, not shown.

[0051] The observing means 84 observes the presence of arrival of the response signal Sa (whether or not conformity of ID was detected by the response signal verifying means 82) based on the output of the request signal Sr. From the time point when the request data Dr is outputted, the request signal generating means 80 enters into a standby state for waiting input of the response signal Sa. When the response signal Sa arrived within a predetermined time period, it outputs an unlock signal to the first driving circuit 52 and a turning ON signal to the second driving circuit 54.

[0052] The first driving circuit 52 drives the actuator 64 based on input of the unlock signal from the CPU 42, and releases the locking state of the handle 102 and the seat 108. With this unlocking operation, steering by the handle 102 is enabled, and the seat 108 is moved slightly upward, so that the user can easily recognized that the handle 102 and the seat 108 are unlocked.

[0053] The second driving circuit 54 is turned ON based on input of the turning ON signal from the CPU 42, and then when the main relay 66 is turned ON by the main switch 62 being turned ON, the engine starts and thus the specific vehicle is enabled to travel.

[0054] When the main switch 62 is turned OFF, the main relay 66 is also turned OFF and the engine is stopped simultaneously. When the locking operation is performed, or, for example, when the handle 102 and

indicating response to the ID data, and outputs it to a transmitting circuit 28 as transmitting data Dt. The transmitting circuit 28 includes a transmitting antenna, not shown, modulates a carrier wave based on the transmitting data Dt supplied from the CPU 24, and transmits it to a request signal Sq through the transmitting antenna. The frequency of the carrier wave of the request signal Sq is from 200 MHz to 500 MHz.

[0070] On the other hand, as shown in Fig. 13, a control unit 14 mounted on the specific vehicles 100A and 100B has substantially the same construction as the control unit 14 according to the first embodiment (See Fig. 3) described above, but differs in that the transmitting circuit 46 and the transmitting antenna 72 do not exist, in that a switching circuit 160 for selectively stopping supply of electric power to the receiving circuit 44, and in that a switching control circuit 154 for outputting a turning ON signal So and an intermittent pulse signal Sk to the switching circuit 160 to control ON and OFF the switching circuit 160 is provided.

[0071] The receiving circuit 44 includes a receiving antenna, not shown, receives a request signal Sq or the like transmitted from the electronic key 12 through the receiving antenna, takes them out from the carrier wave and demodulates the same. The demodulated signal is supplied to the CPU 42.

[0072] The CPU 42 performs at least three programs (a request signal verifying means 156, an observing means 84, and a timer means 158).

[0073] The request signal verifying means 156 verifies whether or not the signal supplied from the receiving circuit 44 is the request signal Sq, and when it is the request signal Sq, verifies whether or not ID data included in the request signal Sq is identical to the ID data registered in a memory, not shown.

[0074] The observing means 84 observes the presence of arrival of the request signals Sq (whether or not conformity of ID was detected by the request signal verifying means 156). When the request signal Sq from the electronic key 12 that the qualified user carries is detected, an unlocking signal is supplied to the first driving circuit 52 to release the locked state of the handle 102 and the seat 108, and the second driving circuit 54 is turned ON. Subsequently, when the main relay 66 is turned ON by the main switch 62 being turned ON, the engine starts and the specific vehicle is enabled to travel.

[0075] When the main switch 62 is turned OFF, the main relay 66 is also turned OFF and thus the engine is stopped simultaneously. At this time, the second driving circuit 54 is turned OFF.

[0076] The timer means 158 outputs a continuation instruction signal Sc to the switching control circuit 154 when the start switch 70 is turned ON, during a period in which the main switch 62 is in ON-state, and during a period from the time point when the main switch 62 is turned OFF to the time point when the timer means 158 counts a predetermined value.

[0077] When timer means 158 also outputs an intermittent instruction signal Sp to the switching control circuit 154 at the stage where it started to count a reference clock supplied from a clock generator, not shown, from the time point when the main switch 62 is turned OFF, and counted to a predetermined value (for example, at the state where a period of two days, a week, and so on have elapsed).

[0078] The switching control circuit 154 outputs the turning ON signal So to the switching circuit 160 during period in which the continuation instruction signal Sc is supplied from the timer means 158. The switching circuit 160 turns a switch 162 ON based on the turning ON signal So supplied, and accordingly, power supply to the receiving circuit 44 is constantly continued.

[0079] At the time point when the intermittent instruction signal Sp is supplied from the timer means 158, the switching control circuit 154 generates an intermittent pulse signal Sk of which the attribute is switched to ON and OFF intermittently and output it to the switching circuit 160. The switching circuit 160 repeats ON operation and OFF operation based on the supplied intermittent pulse signal Sk. Accordingly, power supply to the receiving circuit 44 is made intermittently and thus the control unit 14 is transferred to a power saving mode.

[0080] When the start switch 70 is turned ON in this power saving mode, the continuation instruction signal Sc is output to the switching control circuit 154 from the timer means 158, whereby power supply to the receiving circuit 44 is constantly continued.

[0081] In the electronic key system 10B according to the second embodiment, when the specific vehicles 100A and 100B are not actuated for a predetermined period, power supply to the receiving circuit 44 is made intermittently until the start switch 70 is turned ON thereafter. Therefore, power consumption during standby may be reduced.

[0082] Referring now to Fig. 14, an electronic key system 10C according to a third embodiment will be described. The members and units corresponding to Fig. 13 will be represented by the same reference numerals and will not be described again.

[0083] An electronic key 12 used in the electronic key system 10C according to the third embodiment is the same as the electronic key 12 according to the second embodiment described above (See Fig. 12).

[0084] A control unit 14 has substantially the same construction as the control unit 14 according to the second embodiment (See Fig. 13), but differs in that a turning ON signal So and a turning OFF signal Sf are supplied from a switching control circuit 154.

[0085] In other words, a timer means 158 outputs a continuation instruction signal Sc to the switching control circuit 154 when a start switch 70 is turned ON, during a period in which a main switch 62 is in ON-state, and during a period from the time point when the main switch 62 is turned OFF to the time point when the timer means 158 counts a predetermined value.

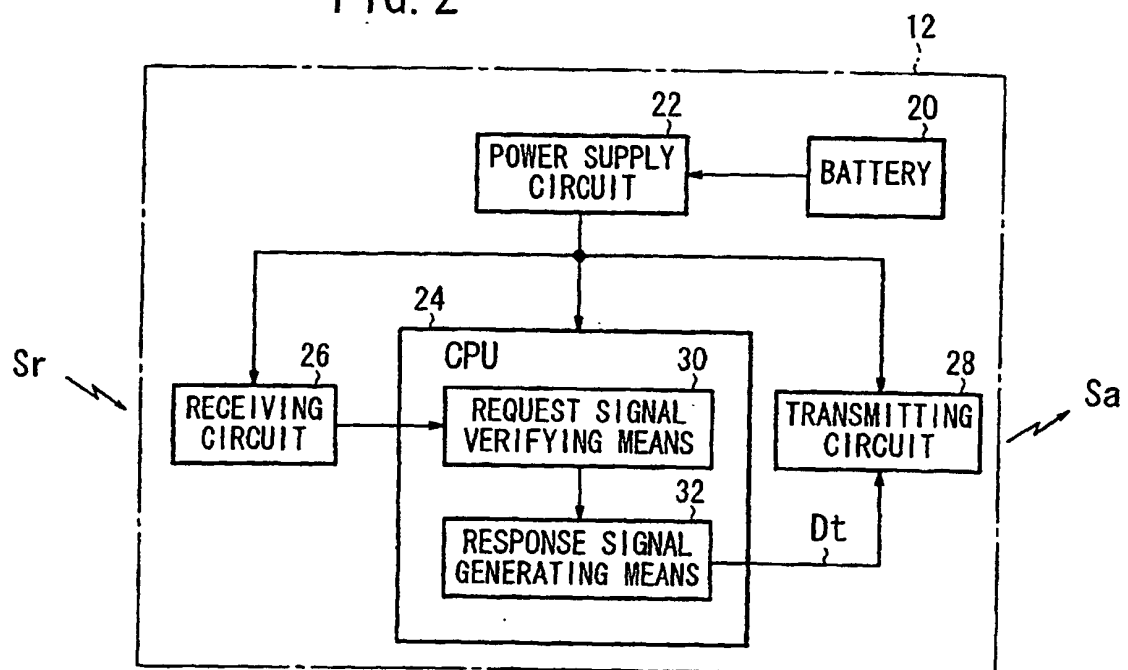
an openable and closable seat (108) on which the user sits, and a locking unit (64) for locking the seat (108) against an opening operation until an unlock instruction is supplied,  
 the mobile transmitter (12) comprising a means (150) for supplying a request signal (Sr) to the control unit (14) based on the user's input;  
 the control unit (14) comprising:

a means (44) for receiving a request signal (Sr) from the mobile transmitter (12) based on a turning-ON operation of a start switch (70) installed in the seat (108) or in the vicinity of the seat (108), and  
 a means (84) for supplying an unlock instruction to the locking unit (64) when it is identified that a request is fed from a qualified user as a result of verification of the request signal (Sr).

least for manually opening and closing the seat (108).

- 5 13. An electronic key system for a motorcycle according to claim 12, **characterized in that** the start switch (70) is provided on the handle (112) at the position opposing the seat (108).
- 10
- 15
- 20
- 25 8. An electronic key system for a motorcycle according to claim 7, further comprising a means (154,162) for stopping power supply at least to a circuit system (44) of the control unit (14), which performs communication, when the specific vehicle (100A,100B) is not actuated for a predetermined period, and a means for supplying power to the circuit system (44) based on the turning-ON operation of the start switch (70).
- 30
- 35 9. An electronic key system for a motorcycle according to claim 7, further comprising a means (154,162) for supplying power intermittently at least to the circuit system (44) of the control unit (14), which performs communication, when the specific vehicle (100A,100B) is not activated for a predetermined period, and a means (154,162) for supplying power constantly to the circuit system (44) based on the turning-ON operation of the start switch (70).
- 40
- 45 10. An electronic key system for a motorcycle according to claim 7, **characterized in that** an operating element (70a) of the start switch (70) is provided so as to oppose the back surface of the superficial skin (122) of the seat (108).
- 50 11. An electronic key system for a motorcycle according to claim 10, **characterized in that** the operating element (70a) of the start switch (70) is provided so as to oppose the back surface of the superficial skin (122a) on the side surface of the seat (108).
- 55 12. An electronic key system for a motorcycle according to claims 7, **characterized in that** the start switch (70) is provided on the handle (112) used at

FIG. 2



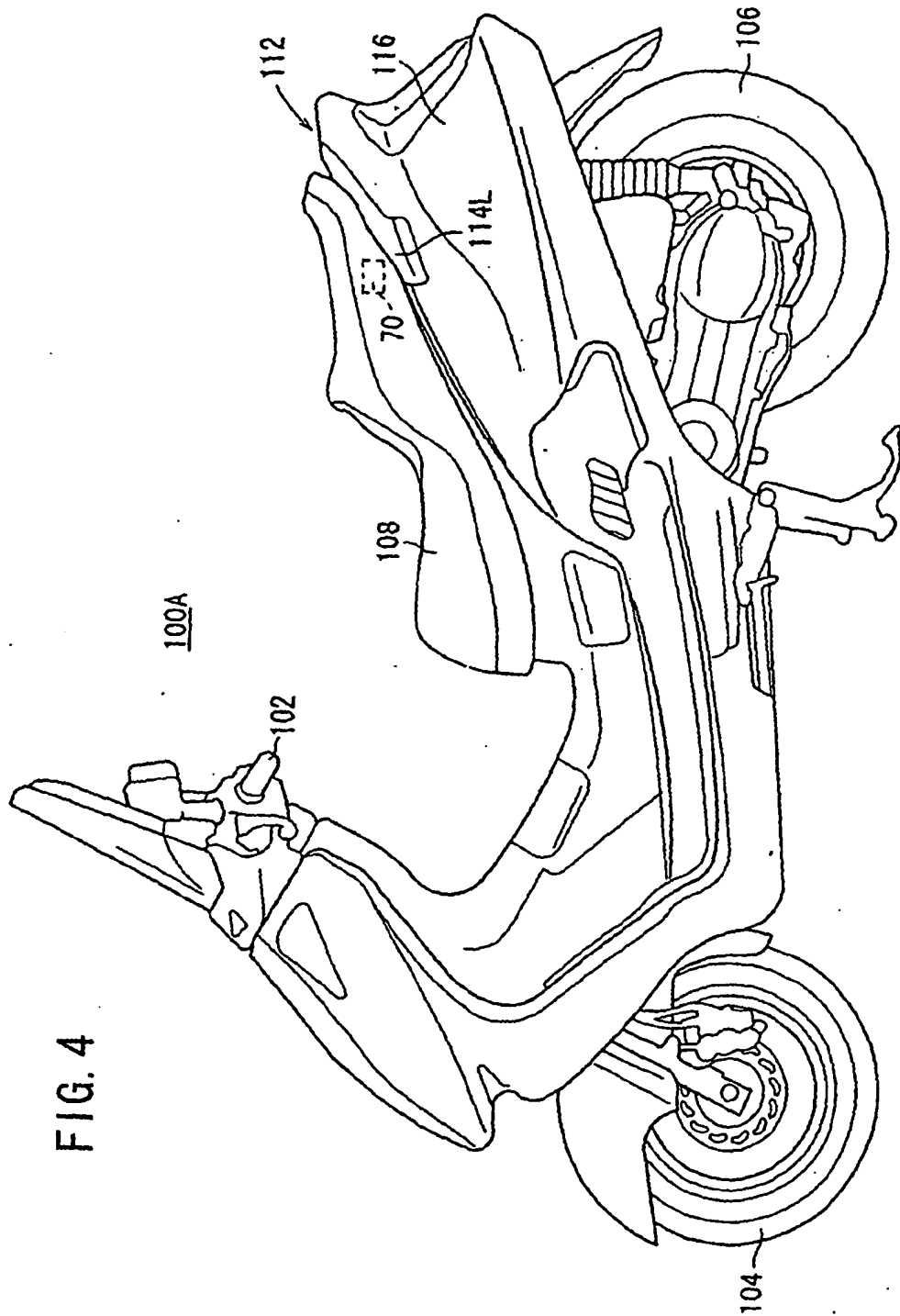
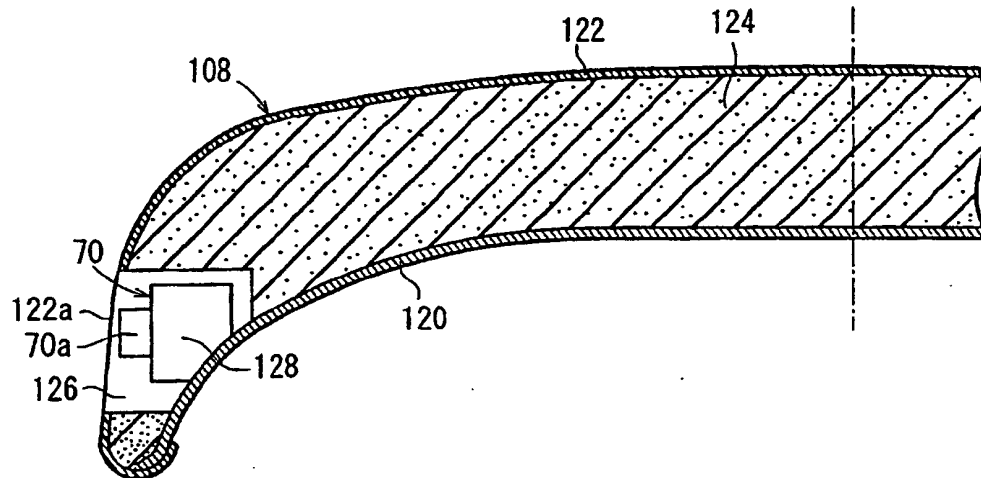


FIG. 6





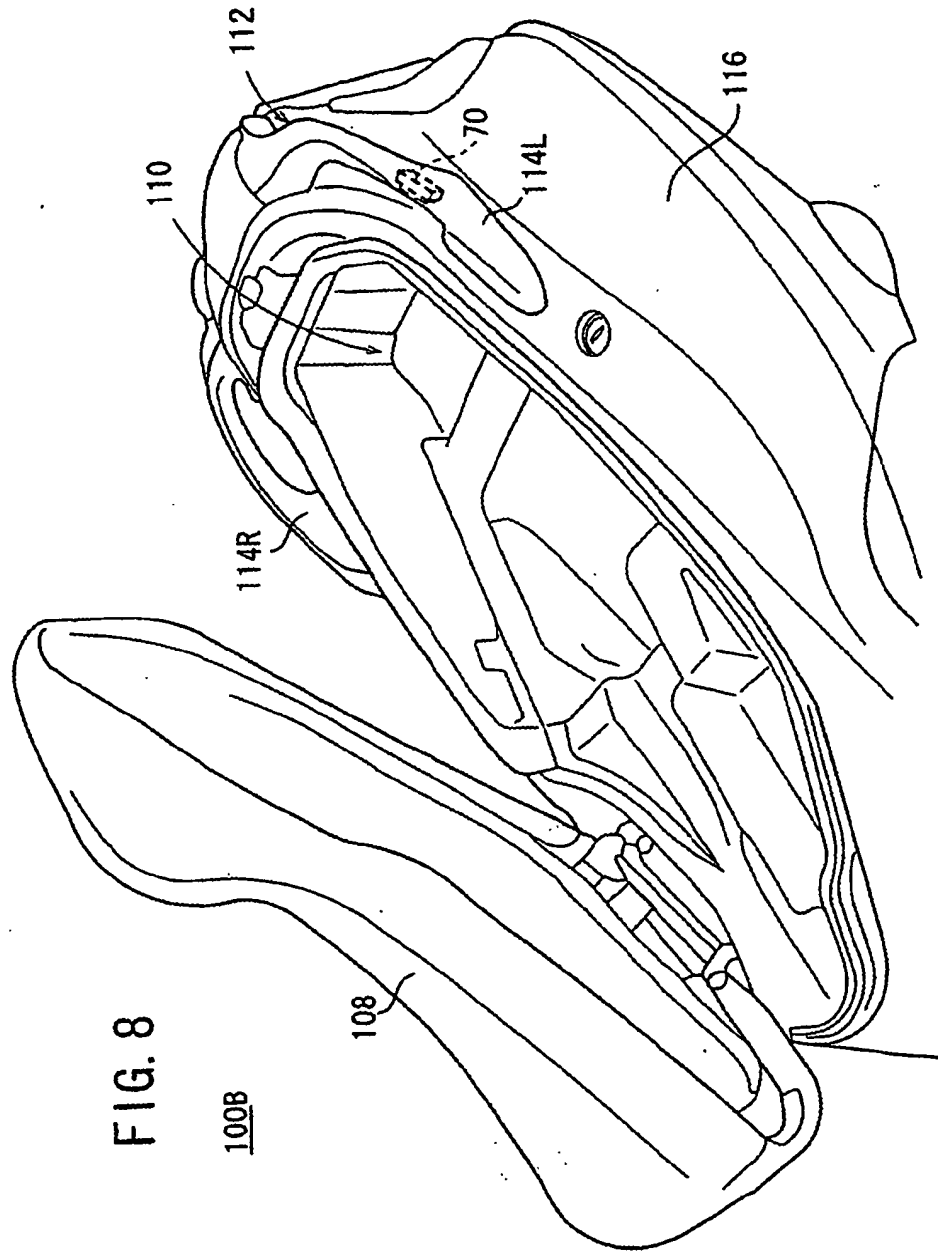


FIG. 10B

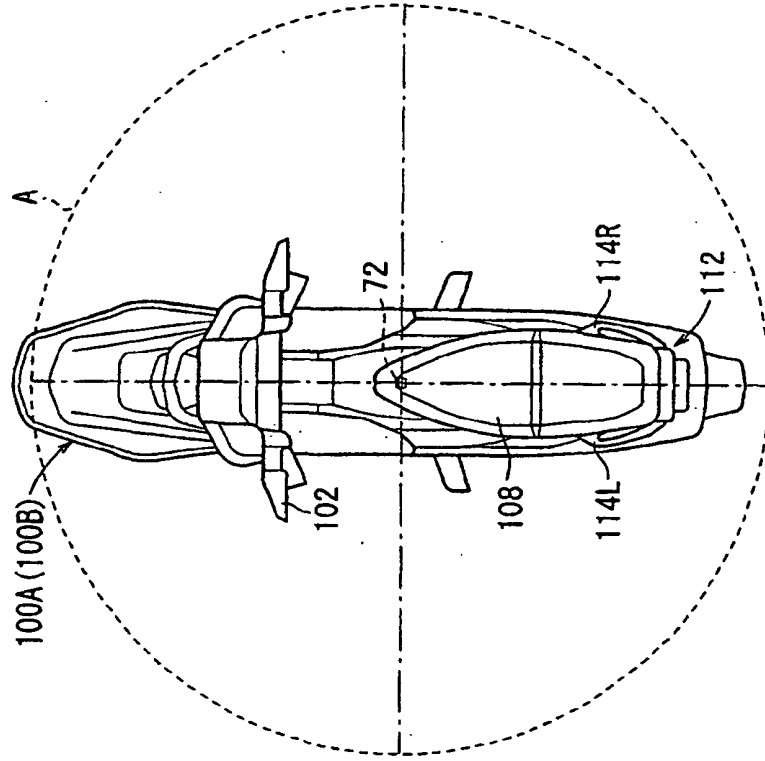


FIG. 10A

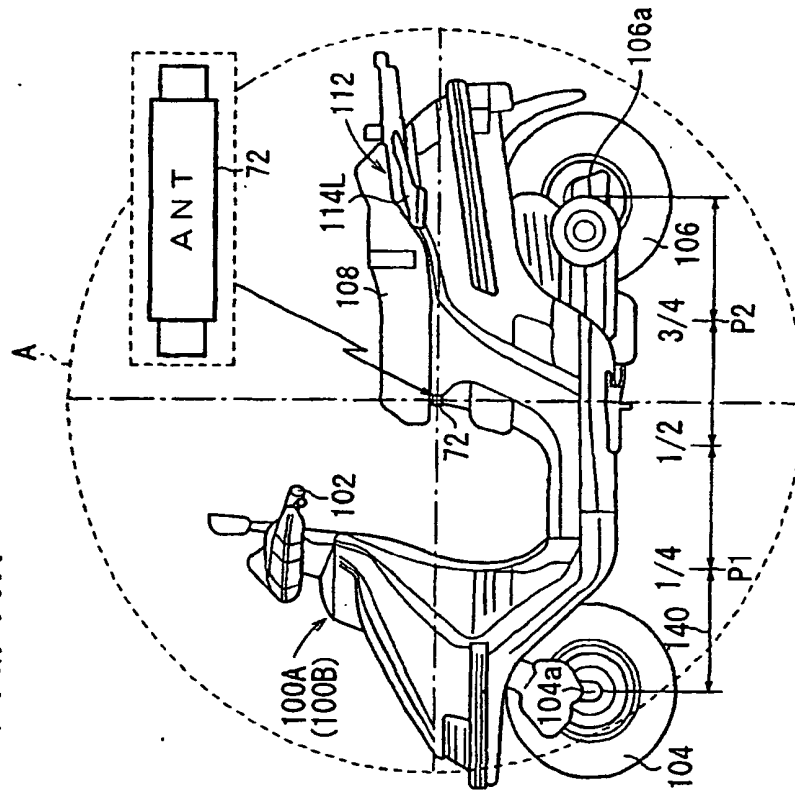
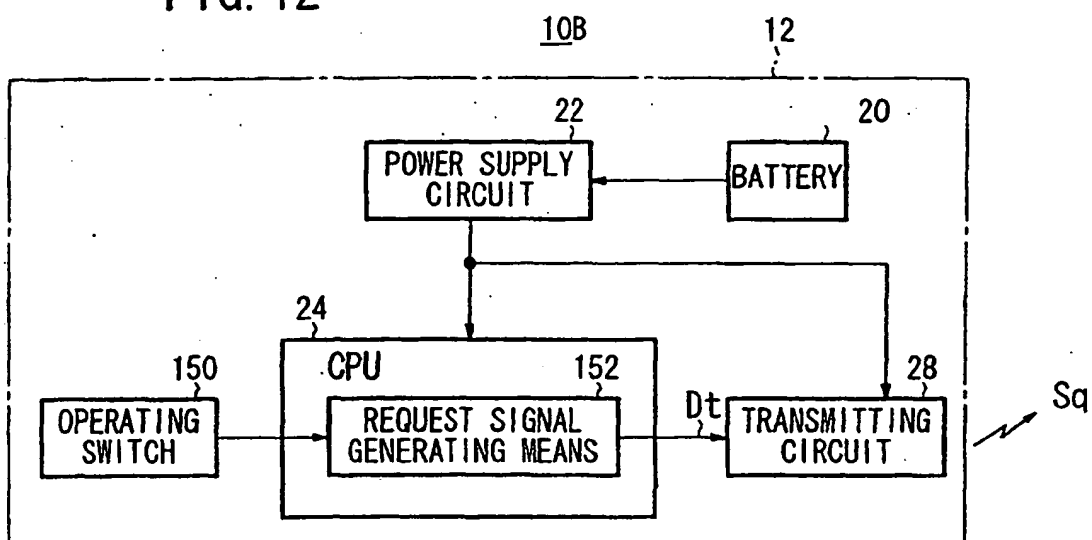
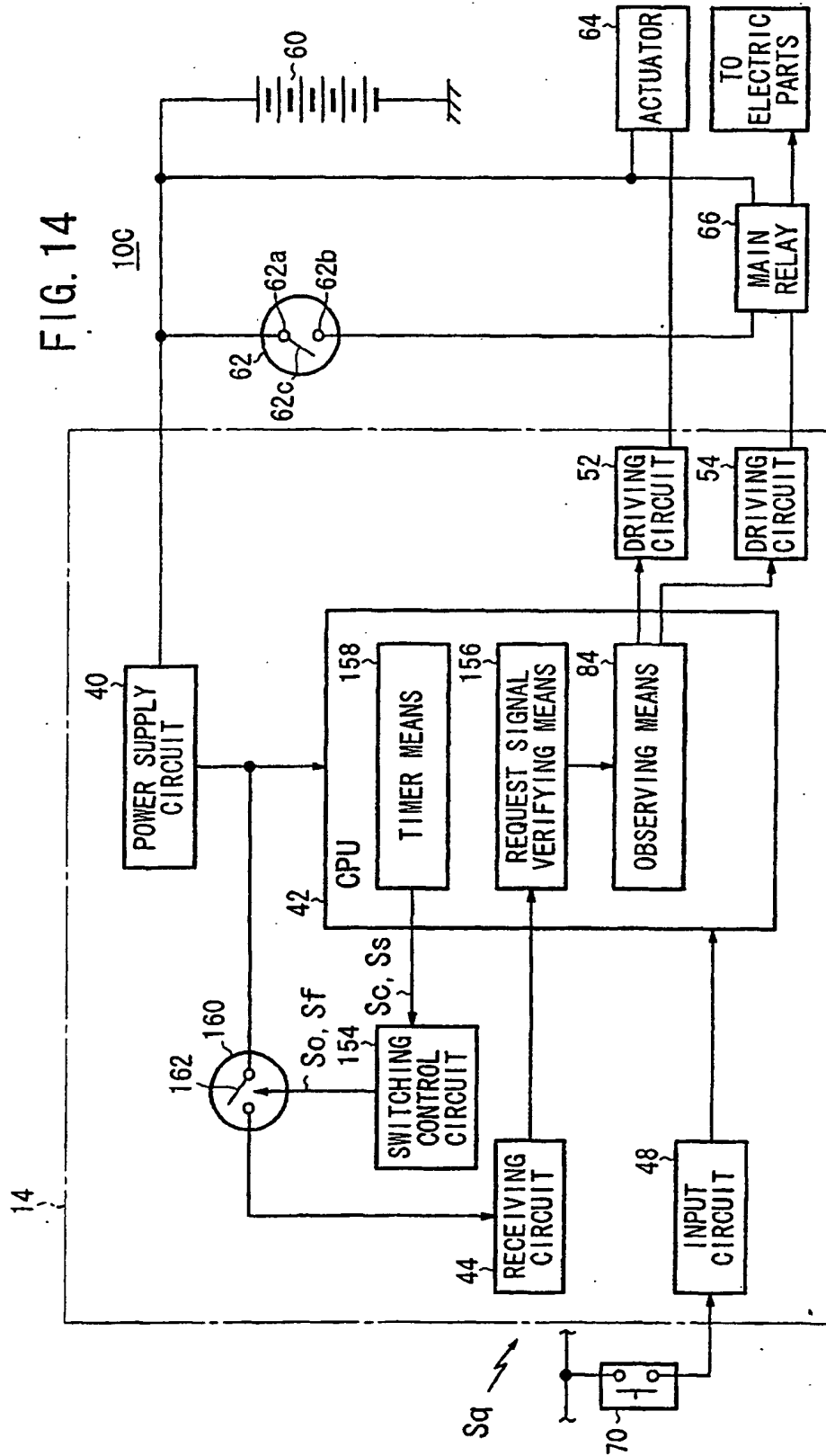


FIG. 12





## INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP03/12273

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP 11-334665 A (IIC Kabushiki Kaisha), 07 December, 1999 (07.12.99), Full text; Figs. 1 to 13 (Family: none)	2, 8

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